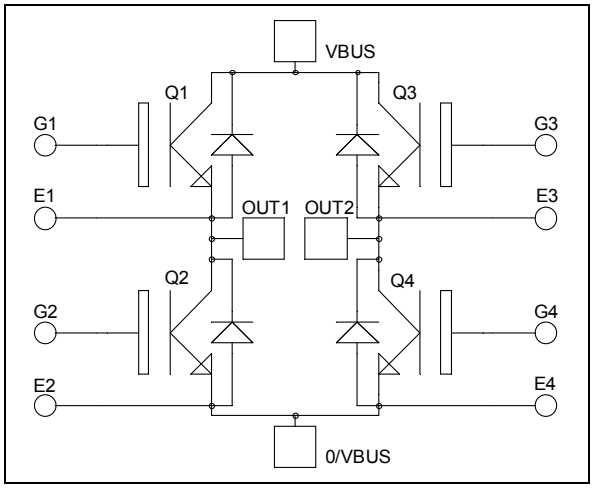
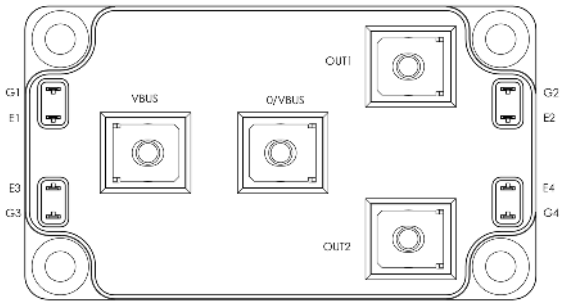
APTGLQ200H65G

Full bridge
High speed Trench + Field Stop IGBT4
Power Module

V_{CES} = 650V
I_C = 200A @ Tc = 60°C





Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- ***High speed Trench + Field Stop IGBT 4 Technology***
  - Low voltage drop
  - Low leakage current
  - Low switching losses
- Very low stray inductance
- Kelvin emitter for easy drive

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Low profile
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings (per IGBT)

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Voltage		650	V
I_C	Continuous Collector Current	T_C = 25°C	270	A
		T_C = 60°C	200	
I_{CM}	Pulsed Collector Current	T_C = 25°C	540	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Power Dissipation		680	W

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Electrical Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 650V				75	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{GE} =15V I_C = 200A	T_j = 25°C	1.4	1.85	2.3	V
			T_j = 150°C		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 3.2 mA		4.2	5.1	5.6	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				300	nA

Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz			12.2		nF
C_{oes}	Output Capacitance				0.43		
C_{res}	Reverse Transfer Capacitance				0.36		
Q_G	Gate charge	V_{GE} = 15V, I_C = 200A V_{CE} = 480V			1260		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{Bus} = 400V I_C = 200A R_G = 1.8Ω			19		ns
T_r	Rise Time				33		
$T_{d(off)}$	Turn-off Delay Time				197		
T_f	Fall Time				21		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) V_{GE} = ±15V V_{Bus} = 400V I_C = 200A R_G = 1.8Ω			19		ns
T_r	Rise Time				29		
$T_{d(off)}$	Turn-off Delay Time				227		
T_f	Fall Time				22		
E_{on}	Turn on Energy	V_{GE} = ±15V V_{Bus} = 400V I_C = 200A R_G = 1.8Ω	T_j = 150°C		4.8		mJ
E_{off}	Turn off Energy		T_j = 150°C		4		
R_G	Integrated gate resistor				1		Ω
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 400V t_p ≤5µs ; T_j = 150°C			1400		A
R_{thJC}	Junction to Case Thermal Resistance					0.22	°C/W

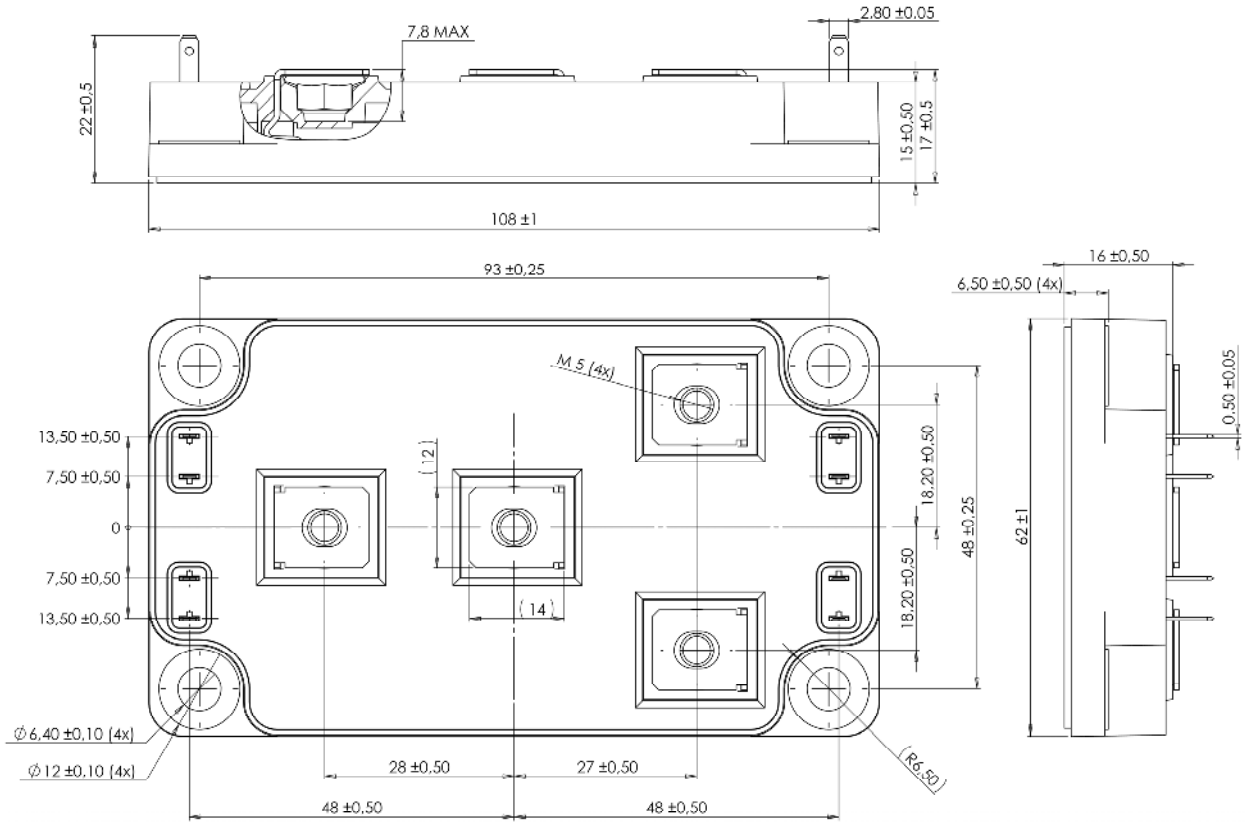
Diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					650	V
I_{RM}	Reverse Leakage Current	V_R = 650V				50	µA
I_F	DC Forward Current		Tc = 25°C		200		A
V_F	Diode Forward Voltage	I_F = 200A V_{GE} = 0V	T_j = 25°C		1.6	2	V
			T_j = 150°C		1.5		
t_{rr}	Reverse Recovery Time	I_F = 200A V_R = 300V di/dt =2800A/µs	T_j = 25°C		125		ns
			T_j = 150°C		220		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		9.4		µC
			T_j = 150°C		20		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		2.2		mJ
			T_j = 150°C		4.8		
R_{thJC}	Junction to Case Thermal Resistance					0.39	°C/W

Thermal and package characteristics

Symbol	*Characteristic*			*Min*	*Max*	*Unit*
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T_J	Operating junction temperature range			-40	175	°C
T_{JOP}	Recommended junction temperature under switching conditions			-40	$T_J$max -25	
T_{STG}	Storage Temperature Range			-40	125	
T_C	Operating Case Temperature			-40	125	
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight				300	g

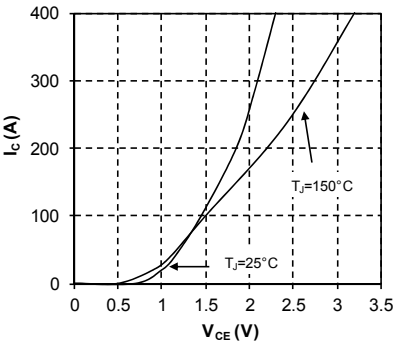
Package outline (dimensions in mm)



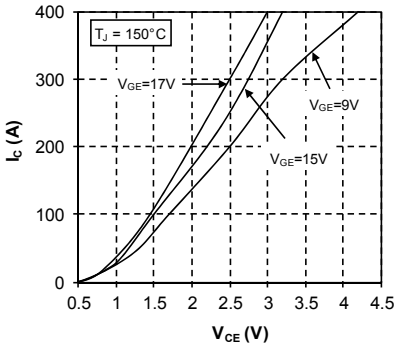
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve

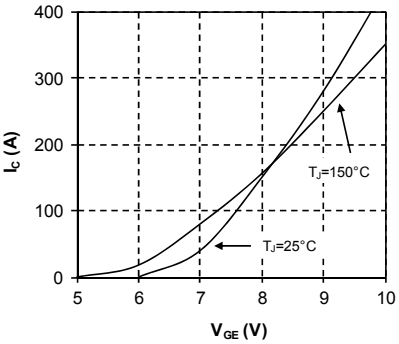
Output Characteristics (V_{GE}=15V)



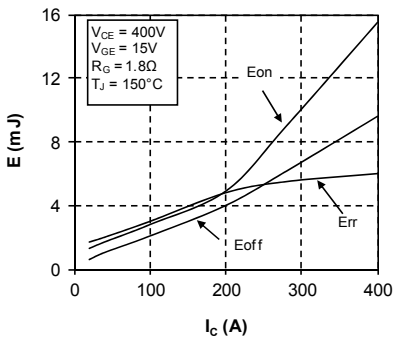
Output Characteristics



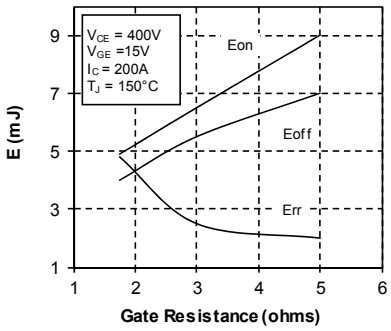
Transfert Characteristics



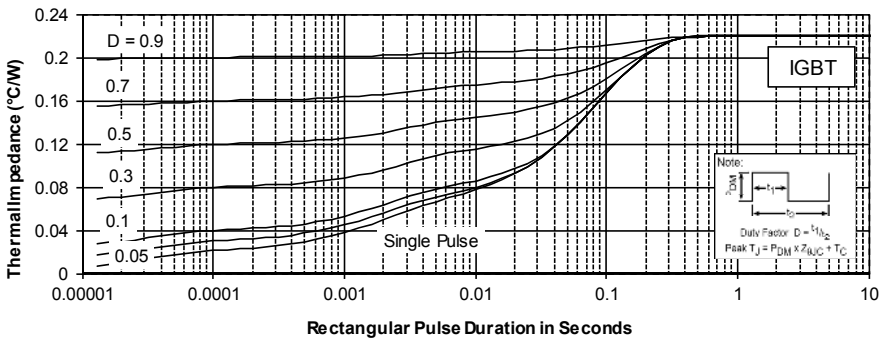
Energy losses vs Collector Current

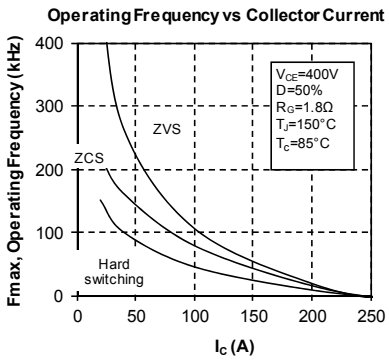


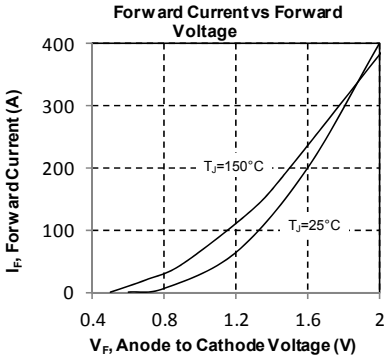
Switching Energy Losses vs Gate Resistance

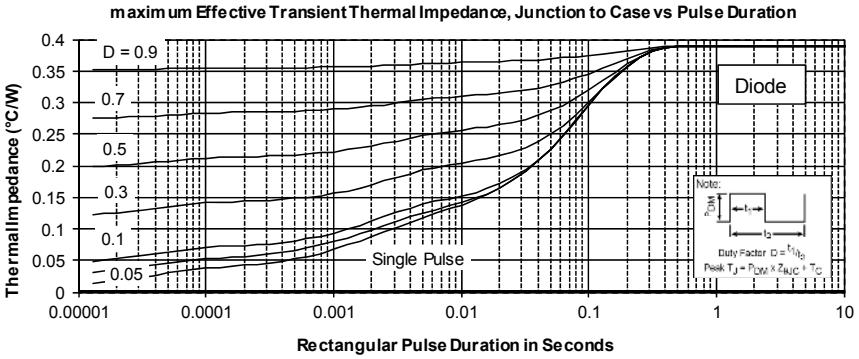


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration




Operating Frequency vs Collector Current
Fmax, Operating Frequency (kHz)
400
300
200
100
0
ZVS
ZCS
Hard switching
VCE=400V
D=50%
RG=1.8Ω
TJ=150°C
TC=85°C
0
50
100
150
200
250
IC (A)


Forward Current vs Forward Voltage
IF, Forward Current (A)
400
300
200
100
0
TJ=150°C
TJ=25°C
0.4
0.8
1.2
1.6
2
VF, Anode to Cathode Voltage (V)


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration
Thermal Impedance (°C/W)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
D = 0.9
0.7
0.5
0.3
0.1
0.05
Single Pulse
Diode
Note:
Duty Factor D = t1/t2
0.00001
0.0001
0.001
0.01
0.1
1
10
Rectangular Pulse Duration in Seconds

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